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PETROGRAPHIC TERMS FOR FIELD USE

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Velut aegri somnia, vanae
Finguntur species, ut nec pes nec caput uni
Reddatur formae.

—Horace, *De arte poetica*, 7.

Horace wrote this stanza with no idea of how aptly it would apply to the megascopic classifications of rocks in use at the beginning of the twentieth century. When the estimable authors of the Quantitative System appended a field classification to their system, they recognized the impossibility of accurately determining rocks megascopically, and said:

It is obvious that a considerable part of the system of classification and nomenclature here proposed can only be applied upon microscopical or chemical investigation. . . . For these reasons . . . we are convinced of the need of general petrographical terms, which will be serviceable in the field work of the petrologist, and which will be of use to the general geologist and to those who may not be able to carry on microscopical and chemical investigations.

The authors proposed to select, from the terms originally given by the geologists of the past, certain rock names and to give to them their original significance "so far as possible, with only such modifications as a somewhat more systematic treatment of the matter may suggest." The suggestion was truly commendable, for the need of a field classification was seriously felt. Unfortunately, perhaps, we are not living in the old days. The former rock terms have, in the course of time, acquired new meanings, and an attempt to revive the old ones produces much confusion.

Ut sylvae foliis pronos mutantur in annos,
Prima cadunt; ita verborum vetus interit aetas,
Et juvenum ritu florent modo nata vigetque.

—Horace, *op. cit.*, 60.

And so it is with the old petrographic terms.

So far as the grouping of the rocks proposed by C. I. P. W. is concerned, it is most admirable, and can hardly be improved upon; it is only upon the rock terms chosen by them that any criticism falls. Teaching the names as selected, it is necessary to impress upon the student that these are only indefinite field terms—and he immediately wants to know the more exact definitions. The student who later takes up microscopical work finds—at the present time when the older systems must still be taught, even if supplementary to the newer—that these definitions produce confusion, and he must either “unlearn” the field terms or else originally he must have learned the more exact usage as well. The objection to the latter method is that it makes double work for those students who want only a general megascopic knowledge of the rocks. Had some simple change been made by the authors of the Quantitative System, either in the words used or in their endings, this difficulty would have been overcome. The following substitutes are proposed as expressing, more or less, the fact that the general type of rock represented by the original name is the one preponderating in the group, and for this reason the suffix *-eid* (from *εἶδος*, “form, appearance”) was chosen. As a matter of fact the change proposed is not so great as the spelling would suggest. It is only a change in the *pronunciation* produced by the substitution of a single letter—from granite to granide, syenite to syenide, etc. The object in using *-eid* instead of *-ide* is twofold. It conforms to the derivation of the word, and in those countries where the final *e* is omitted, the ending *ide*, changed to *id*, has the short sound; *-eid* is everywhere pronounced the same. It will be noted that some of the C. I. P. W. terms are retained, for to such words as phanerite and aphanite there are no objections. For uniformity, however, the same ending is used below in these forms as in the others.

As divided by the authors of the Quantitative System, so here also the rocks are divided into three main divisions.

I. *Phanereids* (*φανερος*, “visible,” and *εἶδος*, “form”). Rocks whose different constituents can be seen megascopically.

II. *Aphaneids* (*αφανής*, “unseen,” and *εἶδος*). Rocks which contain a greater or lesser amount of megascopically indeterminate components. These are subdivided into

a) *Aphaneids*, properly so called. Non-porphyritic.

b) *Aphaneid porphyries*. Porphyritic rocks with aphanitic groundmasses. For consistency some other word should be substituted for porphyry, since this term is generally applied only to orthoclase rocks, and by some writers to rocks with two generations of minerals, with or without phenocrysts. The term, however, is in such general use among miners and quarrymen, and by the U.S. Geological Survey, for all rocks containing larger crystals in a fine-grained or dense ground-mass, that it may be better to retain it. Poikileid (ποικίλος, "spotted," and εἶδος) would be much better.

III. *Glasses*. Rocks which are hyaline or which have hyaline ground-masses.

On the basis of mineral composition, the rocks can be divided megascopically most easily into those that are light and those that are dark. Consequently the groups are divided into those in which

1. Femag¹ minerals form less than half the rock.
2. Femag minerals form over half the rock.
3. Light-colored minerals absent or nearly so.

While it is generally impossible to separate different feldspars megascopically, quartz can usually be recognized. Its presence or absence is therefore made the basis of a further subdivision, as is also the presence or absence of olivine in the no-feldspar rocks.

It has been found possible to subdivide the rocks megascopically into the following groups:

I. PHANEREIDS

Graneid.—A holocrystalline, medium- to coarse-grained igneous rock, consisting of quartz and any kind of feldspar, with one or more members of the biopyribole group,² generally biotite or hornblende. The femag minerals form less than 50 per cent of

¹ The term *femic* has been used repeatedly by recent writers as synonymous with ferro-magnesian. This is incorrect, since femic minerals include apatite, fluorite, calcite, etc. The term *femag* is here used for ferro-magnesian.

² *Biopyribole* is suggested as a substitute for the awkward words biotite { and }
pyroxene { and } amphibole, and *pyribole* for pyroxene { and } amphibole.

the rock. Under this term are included all granites, and the light-colored quartz diorites.

Syeneid.—A holocrystalline, medium- to coarse-grained igneous rock, consisting of one or more kinds of feldspar and one or more members of the biopyribole group, generally biotite or hornblende. The femag minerals form less than 50 per cent of the rock. Under this term are included syenites, nephelite syenites, and the light-colored diorites.

There is a slight objection to this term in that the pronunciation is the same as cyanide. Sinai-eid (the rock at Sinai being a true syenite) might be used except for the superabundance of vowels. Esseneid or Assuaneid, from the modern names for Syene, are also suggested, but on the whole, on account of the common use of the term syenite, it seems best to retain syeneid.

Dioreid.—A holocrystalline, medium- to coarse-grained igneous rock in which the femag mineral is an amphibole and forms over half the constituents. Feldspar, of any kind, is subordinate in amount. To this group belong the shonkinites, the dark-colored diorites, and the hornblende gabbros.

Quartz dioreid is a subgroup.

Gabbreid.—A holocrystalline, medium- to coarse-grained igneous rock in which the femag mineral is pyroxene and forms over 50 per cent. Feldspar, of any kind, is subordinate in amount. Here are included the augite diorites, gabbros, and norites.

Quartz gabbreid is a subgroup.

Dolereid.—It is usually impossible to determine, megascopically, the species of pyribole present. In such cases the term dolereid may be used instead of dioreid or gabbreid.

Quartz dolereid is a subgroup.

Pyroxeneid.—A holocrystalline, medium- to coarse-grained igneous rock which consists almost entirely of pyroxene. The term covers the rocks now called pyroxenites.

Amphiboleid.—A holocrystalline, medium- to coarse-grained igneous rock which consists almost entirely of amphibole. It includes igneous hornblende rocks, whether the hornblende is primary or secondary.

Pyriboleid.—A holocrystalline, medium- to coarse-grained ig-

neous rock, consisting almost entirely of one or more members of the pyribole group. It includes the pyroxeneids and amphiboleids, and corresponds to dolereid among the feldspar rocks.

Peridoteid.—A holocrystalline, medium- to coarse-grained igneous rock, consisting of olivine, with or without pyriboles. Feldspar is absent. This group includes the peridotites.

II. APHANEIDS

Felseid.—An aphanitic igneous rock, non-porphyrific and light-colored. Here are included non-porphyrific rhyolites, trachytes, phonolites, latites, and the light-colored andesites. They are *leuco-aphaneids* (λευκος, "white").

Felseid porphyry.—Under this head are grouped all light-colored porphyritic igneous rocks with aphanitic ground-masses. They may also be called *leucophyreids*.

Quartz felseid porphyries or quartz leucophyreids are those felseid porphyries among whose phenocrysts quartz can be recognized. Other mineral modifiers, such as orthoclase, biotite, hornblende, etc., may be used for different varieties.

Anameseid.—An aphanitic igneous rock, non-porphyrific and dark colored, generally dark gray, dark green, dark brown, or black. In this group are included the dark andesites and basalts. They are *melano-aphaneids* (μελανος, "dark").

No sharp line can be drawn between these rocks and the felseids. The relative amounts of the dark and the light constituents cannot be determined megascopically, and it is only possible to classify the felseids by their colors, which are white, yellow, light brown, pink, and pale gray.

Basalt, being such an overworked word, von Leonhard's term anamesite was chosen instead as the root. It was originally applied to basaltic rocks of such fine texture that the constituents were indistinguishable megascopically.

Anameseid porphyry.—In this group belong all dark-colored porphyritic igneous rocks with aphanitic ground-masses. The term *melanophyreid* may also be used. If the phenocrysts can be determined, their names may be prefixed, as biotite melanophyreid or biotite anameseid porphyry, etc.

III. GLASSES

Since the glasses can be determined megascopically as such, the usual terms are retained, as pumice, obsidian, pitchstone, etc. For the porphyritic glasses the term *vitrophyreids* is proposed.

Tabulating these terms:

	Femag Minerals <50 per cent		Femag Minerals >50 per cent		No Feldspar or Quartz	
	+Quartz	-Quartz	- Quartz	-Quartz	- Olivine	+Olivine
Usual femag	Biotite	Biotite, Amphi- bole	Amphibole	Pyroxene	Pyribole	Olivine, Pyribole
Glasses	Pumice, obsidian, pitchstone, etc.					
Porphyritic glasses	Vitrophyreids					
Aphaneids	Felseid		Anameseid			
Aphaneid porphyries	Felseid-porphyr or leucophyreid		Anameseid porphyry or melanophyreid			
Phanereids	Graneid	Syeneid	Dioreid	Gabbreid	Amphiboleid Pyroxeneid	Peridotoid
			Dolereid		Pyriboleid	

Such a classification can be learned by a student in ten minutes. The rocks are subdivided into as many groups as can be recognized megascopically, and unknown specimens classified by different persons will almost invariably be found to fall into the same groups. Frankly acknowledging, by the names used, the field character of the determinations, there will be no confusion caused if later more exact terms are applied to the same rocks.